

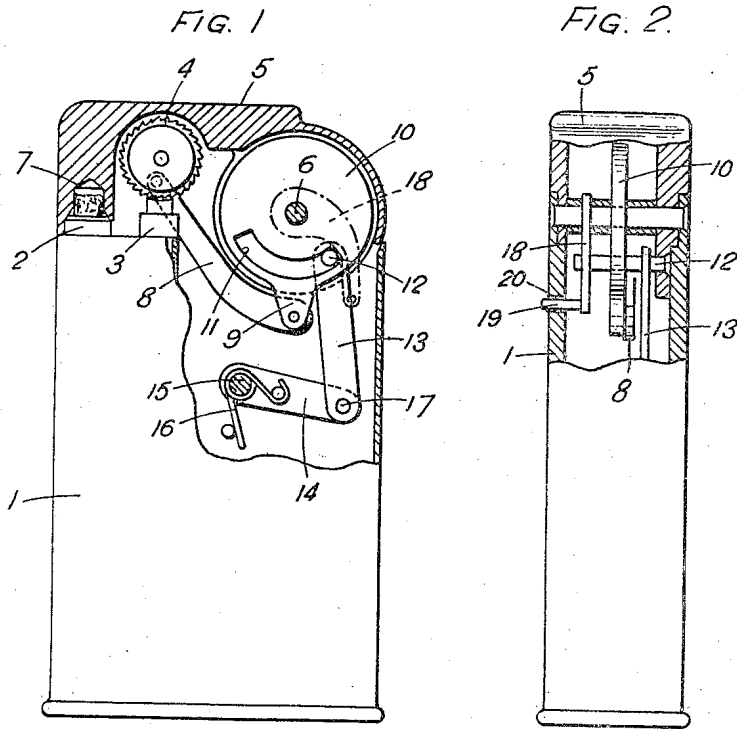
Jan. 10, 1950

H. C. H. SMYTH
PYROPHORIC LIGHTER

2,494,211

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3 Sheets-Sheet 1



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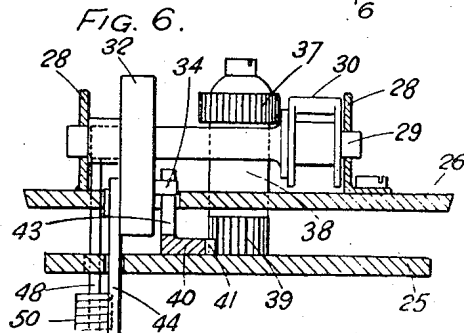
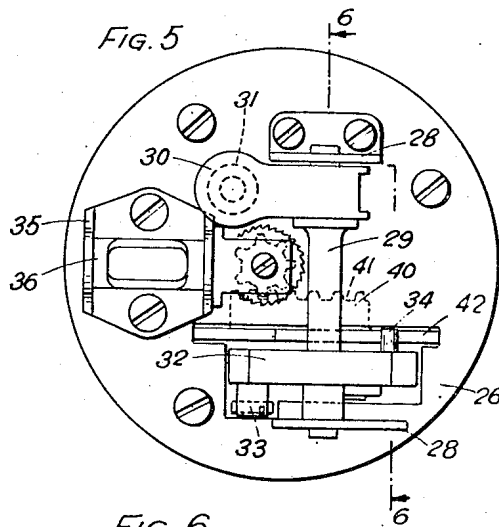
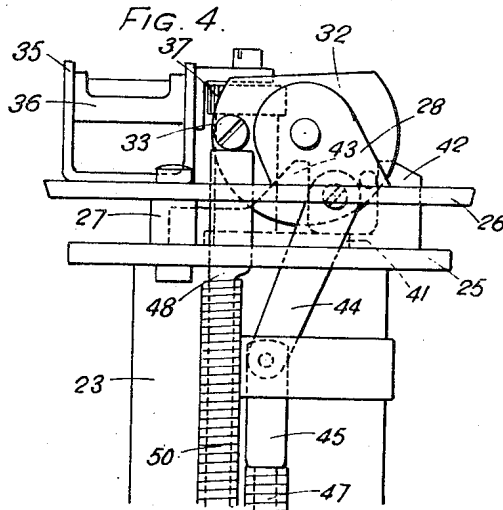
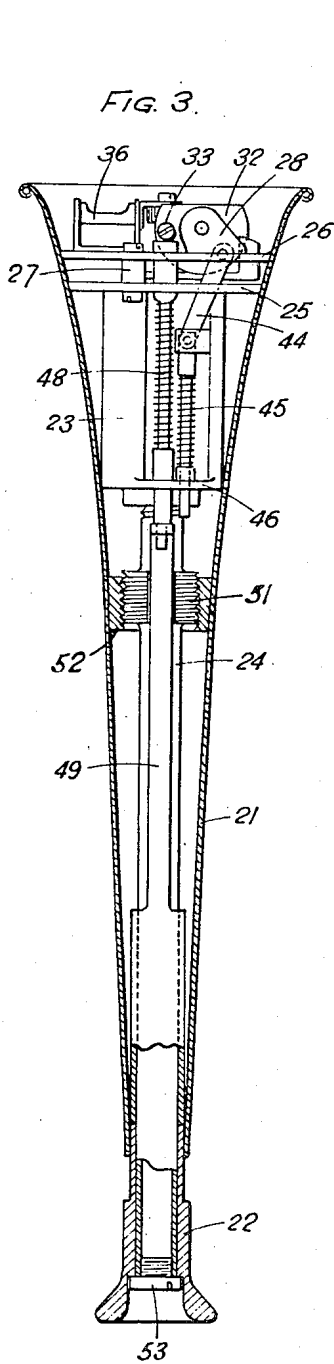
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

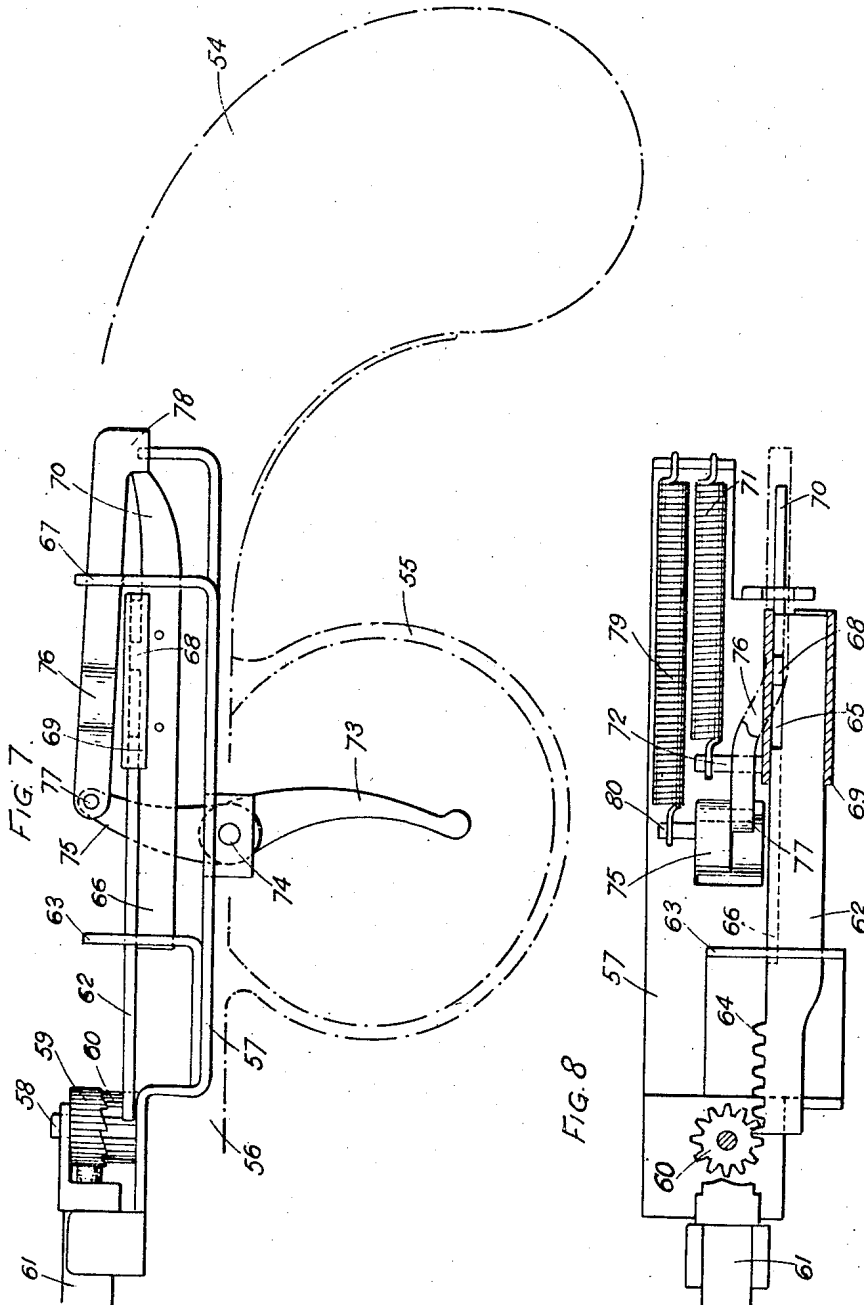


FIG. 8

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UNITED STATES PATENT OFFICE

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PYROPHORIC LIGHTER

Herbert Charles Humphrey Smyth,
London, EnglandApplication October 9, 1946, Serial No. 702,254
In Great Britain May 22, 1945Section 1, Public Law 690, August 8, 1946
Patent expires May 22, 1965

7 Claims. (Cl. 67-7.1)

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This invention relates to pyrophoric lighters of the pocket and/or table type. More especially the invention relates to operating mechanism for such lighters of the kind wherein spring-actuated means is normally moved to stress its spring and is then released to effect the rotation of an abrasive wheel to produce sparks and ignite the wick and it is an object of the invention to provide an improved form of this type of operating mechanism.

According to the present invention the arrangement is such that when released, the spring-actuated means moves freely to a predetermined extent under the action of its spring before striking an operating member which effects the rotation of the abrasive wheel. The free movement of the spring-actuated means enables it to gather momentum before it strikes the operating member and enables a relatively rapid rotative movement to be imparted to the abrasive wheel.

The spring-actuated means may be provided with an abutment adapted to strike an abutment on a link or ratchet directly or indirectly connected with the abrasive wheel, the respective abutments being spaced a predetermined distance apart when the means is in position prior to release for actuation by the spring.

To enable the invention to be fully understood it will now be described with reference to the accompanying drawings in which:

Fig. 1 is a side elevation partly in section of a pyrophoric pocket lighter embodying one construction of the invention;

Fig. 2 is an end view of the lighter shown in Fig. 1;

Fig. 3 is a side elevation of a table lighter, partly in section, embodying a modified form of the invention;

Fig. 4 is an enlarged view of part of the operating mechanism shown in Fig. 3;

Fig. 5 is a plan view of the mechanism shown in Fig. 4;

Fig. 6 is an end view thereof omitting the fuel container, on the line 6-6 of Fig. 5;

Fig. 7 is a side elevation of operating mechanism according to a further modification of the invention, and

Fig. 8 is a plan view of the mechanism according to Fig. 7.

As shown in Figs. 1 and 2 the pocket lighter comprises a body 1 adapted to form a fuel container and provided with a wick tube 2, a flint tube 3 and an abrasive wheel 4 mounted for rotation across the flint.

The lighter is provided with a cover 5 pivoted to the body 1 by a spindle 6 and having a snuffer 7 adapted to fit over the wick tube 2.

The wheel 4 is coupled with a one-way clutch mechanism in known manner the clutch plate of

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which is pivoted to a link 8, the other end of which is pivoted to a lug 9 of a disc 10 rotatably mounted on the spindle 6. The disc 10 is formed with an arcuate slot 11 through which extends a spindle 12 one end of which is journaled in the cover 5 and the other end projects beyond the face of the disc 10.

The spindle 12 is secured to an arm 13 which is pivoted at its free end to an arm 14 pivotally mounted in the lighter body at 15. The two arms 13, 14 form a toggle joint adapted to be rotated in an anti-clockwise direction by a pre-set spring 16.

When the parts are in the position shown in Fig. 1 with the cover closed, the spring 16 is pre-stressed but cannot actuate the mechanism as the spindle 12 is engaging the extreme end of the slot 11. A manually operated device is provided for initiating the movement of the arms and comprises a lever 18 rotatably mounted on the spindle 6 and shaped to lie behind the extension of the spindle 12. The lever 18 has an actuating member 19 which projects through a curved slot 20 in the side wall of the lighter body.

To operate the lighter the member 19 is moved in a clockwise direction in its slot to bring the lever 18 into engagement with the spindle 12 and move it together with the arm 13 until the arms 13, 14 reach a position at which the spring 16 becomes effective to complete the rotation of the arm 13 in a rapid manner. The spindle 12, being connected to the cover 5, the latter is raised automatically.

As the spindle 12 is free in the slot 11 the arm 13 is permitted to travel freely a certain distance and gain momentum before the spindle 12 strikes the end wall of the slot. The disc is therefore given a sharp blow and has a rapid rotative movement imparted to it which is transmitted to the abrasive wheel 4 through the link 8.

The extent of free movement of the spring-actuated arm may be varied by altering the length of the slot. In one example the spindle 12 may travel freely two-thirds of its total movement before striking the end of the slot 11.

It will be understood that the slotted disc 10 and link 8 for driving the abrasive wheel 4 may be replaced by any other convenient mechanism.

A modified form of the invention is shown in Figs. 3 to 6 wherein the lighter casing comprises a body 21 shaped to represent a bugle having a dummy mouthpiece 22 slidable therein.

The operating mechanism is detachably mounted in the body 21 on the outer end of a fuel container 23, the lower end of which is connected to a tube 24 by a screw and nut connection. The upper end of the fuel container 23 carries a plate 25 to which a second plate 26 is secured in spaced relation by studs 27. The plate 26 has brackets 28 in which a spindle 29

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is journaled. Fast on the spindle is a snuffer 30 adapted to fit over the wick tube 31. A plate 32 is also secured to the spindle 29 for rotation therewith, the plate having projecting studs 33, 34 on opposite side faces. The plate 26 also carries a frame 35 which supports a flint tube 36 adjacent to an abrasive wheel 37 which is rotatably mounted on a spindle 38 extending from the plate 25 through an aperture in the plate 26. The spindle 38 carries a toothed member 39 and is spring-pressed to engage the wheel 37, the wheel 37 and end of the member 39 having co-operating dog clutch portions (not shown) to serve as a one-way clutch coupling. The lower plate 25 has a rack 40 slidably mounted in guides, the teeth 41 of the rack meshing with the member 39. The rack has two spaced arms 42, 43 extending on opposite sides of the stud 34.

A lever 44 is provided, its end being pivoted respectively to the plate 28 and a rod 45 engaging in an aperture in a flange 46 and being encircled by a coil spring 47 tending to force the rod 45 upwardly.

A further rod 48 is provided, its upper end extending through apertures in the plates 25, 26 to abut the projection 33 and its lower end extending through the flange 46 and engaging the upper end of an arm 49, the lower end of which is secured to the dummy mouthpiece 22.

In the position shown in Figs. 3 to 6 the lighter action is in preset position with the snuffer covering the wick tube and the spring 47 compressed. By reason of the angle between the lever 44 and the rod 45, the spring cannot actuate the lever.

To set the lighter action in operation, the mouthpiece 22 is pushed inwardly of the body 21 to lift the rod 49. The upper end of this rod engages the stud 33 and rotates the plate 32 until the lever 44 moves past the dead centre position relative to the rod 45 when the spring 47 comes into play and rapidly rotates the plate 28.

During the initial rotation of the plate, the stud 34 moves freely between the rack arms 42, 43 and accordingly gains momentum before it strikes the arm 43 to slide the rack 40 forward and effect the rapid rotation of the abrasive wheel 37 through the toothed member 39.

The snuffer 30 being fast on the same spindle 29 as the plate 32, it is raised simultaneously with the actuation of the plate 32.

The spring 50 automatically withdraws the rod 48 and the action is again preset by closing the snuffer arm by hand into the position shown in Figs. 3 to 6.

The mechanism is secured in the body 21 by a screw-threaded portion 51 screwing into a nut member 52 arranged on the inner side of the body. The mouthpiece is secured by a screw 53 screwing into the tube 24.

In the further modification as shown in Figs. 7 and 8, the lighter operating mechanism is mounted in a pistol holder having a hand grip 54 and a trigger guard 55 attached to a body 56. The operating mechanism is mounted on a base 57 at one end of which is mounted a spindle 58 carrying a flint wheel 59 and a ratchet wheel 60 coupled together by a one-way clutch device in known manner. A flint tube 61 is mounted adjacent the wheel 59 and a wick tube (not shown) is provided at a suitable point adjacent the flint wheel.

A bar 62 is guided for reciprocal movement in a slot in a wall 63, the bar having a rack 64

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at one end for engaging the ratchet wheel 60 and a slot 65 adjacent to its other end. An actuating slide 66 is guided for reciprocating movement in slots in the walls 63 and 67 and is provided with a projection 68 adapted to operate in the slot 65 of the bar 62. A sleeve 69 is secured to the slide 66 and loosely embraces the bar 62 to hold the parts in operative engagement while permitting relative movement between the bar 62 and slide 66. The slide 66 is provided with an upwardly curved rear portion 70 and is urged into the retracted position shown in Figs. 7 and 8 by a spring 71 having one end anchored to a stud 72 on the slide and its other end anchored to the base 57.

A trigger 73 is pivotally mounted on the spindle 74 and is provided with an integral arm 75 having a lever 76 pivoted at 77 to its free end. The lever 76 is cranked to overlie the slide 66 and its free end is formed with a shoulder 78 adapted to engage behind the end of the slide 66. A spring 79, having its end respectively anchored to the base 57 and stud 80 urges the trigger into inoperative position.

To operate the lighter, the trigger is pulled rearwardly about its pivot 74 against the action of the spring 79, and in consequence the lever 76 is moved forwardly by the arms 75. As the shoulder 78 is engaging the end of the slide 66, the slide is carried forward against the action of the spring 71 and during its initial movement moves relatively to the bar 62 until the projection 68 engages the forward end of the slot 65 when the bar 62 is also carried forward, the rack 64 rotating the ratchet wheel 60 which by reason of its one-way clutch coupling does not then rotate the flint wheel 59.

As the slide 66 is moved forwardly, its rear end is gradually depressed by virtue of the upwardly curved portion 70 entering the guide slot in the wall 67 and at the end of the forward movement the slide is sufficiently depressed to disengage its end from the shoulder 78. Immediately this takes place the spring 71, which is in stressed condition, pulls the slide 66 rearwardly. During its initial rearward movement the slide moves freely relative to the bar 62 until the projection 68 strikes the rear end of the slot 65 whereupon the bar 62 is given a sharp blow and is actuated to draw the rack 64 back to rotate the ratchet wheel 60 and with it the flint wheel 59 to provide the sparks to ignite the wick.

In all constructions the abutment carried by the spring-actuated slide or arm is permitted a predetermined free movement before it strikes the member adapted to actuate the abrasive wheel, the permitted free movement being such as to enable the slide or arm to gain sufficient momentum to strike the abrasive wheel operating member a sharp blow and ensure a rapid rotation of this wheel to produce an efficient sparking effect. The sudden rapid rotation of the wheel causes its teeth to bite into the flint at each operation and prevent the surface of the flint becoming polished, and losing its sparking efficiency.

I claim:

1. In a pyrophoric lighter, a body, an ignitable wick, a pyrophoric element supported on said body, an abrasive wheel rotatably mounted on said body in rubbing contact with said pyrophoric element, a spring-actuated arm for effecting the rotation of said abrasive wheel, a coupling member mounted on said body between

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the abrasive wheel and said spring-actuated arm, means operatively connecting said abrasive wheel and said coupling member, a slot in said coupling member, a projection on said arm and reciprocable in said slot, means for moving said arm to space the said projection from an end wall of said slot, and spring means releasable when said projection is spaced from said end wall to move said arm and cause the projection to move freely to gain momentum before striking said end wall of said slot.

2. In a pyrophoric lighter, a body, an ignitable wick, a pyrophoric element supported on said body, an abrasive wheel rotatably mounted on said body in rubbing contact with said pyrophoric element, a spring-actuated arm for effecting the rotation of said abrasive wheel, a coupling member having a slot mounted on said body independently of said abrasive wheel, means operatively connecting said coupling member with said abrasive wheel, a projection on said arm and reciprocable in said slot in the coupling member, spring means for actuating said arm, manually actuated means for moving said arm against the action of said spring to space said projection from an end wall of said slot, and means for effecting the release of said arm to be driven by the spring when the projection is spaced from said end wall whereby the projection is moved freely a short distance before striking said end wall of the said slot.

3. In a pyrophoric lighter, a body, an ignitable wick, a pyrophoric element mounted on said body, an abrasive wheel rotatably mounted on said body in rubbing engagement with said pyrophoric element, an actuating arm, spring means for actuating said arm, a coupling member mounted on said body independently of the abrasive wheel and arm, means operatively connecting said coupling member with said abrasive wheel, a slot having oppositely disposed end walls formed in said coupling member, a projection on said arm and reciprocably mounted in said slot, means for moving said arm to space the said projection from one of said end walls, and trip means for releasing said spring means to actuate the arm when the said projection is spaced from said one end wall to permit said projection a predetermined amount of movement in said slot before striking said one end wall.

4. In a pyrophoric lighter, a body, an ignitable wick, a pyrophoric element supported on said body, an abrasive wheel rotatably mounted on said body in rubbing contact with said pyrophoric element, a spring actuated arm for effecting the rotation of said abrasive wheel, a coupling disc rotatably mounted on said body between the abrasive wheel and said spring actuated arm, means operatively connecting said abrasive wheel and said coupling disc, an arcuate slot in said coupling disc, a projection on said arm and reciprocable in said slot, means for moving said arm to space the said projection from an end wall of said slot, and spring means releasable when said projection and said end wall are in spaced relation to move said arm and cause the projection to move freely under the driving action of said actuating spring a short distance in said slot before striking said end wall.

5. In a pyrophoric lighter, a body, an ignitable wick, a pyrophoric element supported on said

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body, an abrasive wheel rotatably mounted on said body in rubbing contact with said pyrophoric element, a member reciprocably mounted on said body, means operatively connecting one end of said member with said abrasive wheel, a slot in the opposite end of said member, a slide mounted on said body to extend lengthwise of and adjacent to said member, a projection on said slide and positioned within said slot, an actuating spring for effecting sliding movement of said slide, manually actuating means for displacing said slide to stress its actuating spring and position the projection in spaced relation to an end wall of said slot, and means for releasing said slide to be driven by its actuating spring when said projection is spaced from said end wall whereby said projection is caused to strike said end wall after travelling a predetermined distance in said slot.

6. In a pyrophoric lighter, a body, an ignitable wick, a pyrophoric element supported on said body, an abrasive wheel rotatably mounted on said body in rubbing contact with said pyrophoric element, a member reciprocably mounted on said body, means operatively connecting one end of said member with said abrasive wheel, and a slot in the opposite end of said member, a slide mounted on said body to extend lengthwise of and adjacent to said member, a projection on said slide and positioned within said slot, an actuating spring for effecting sliding movement of said slide, manually actuating means for displacing said slide to stress its actuating spring and position the projection in spaced relation to an end wall of said slot, and means for automatically releasing said slide to be driven by its actuating spring when the said projection is spaced from the said end wall of said slot, whereby said projection has a predetermined free movement before striking said end wall to actuate the reciprocably mounted member to effect the rotation of the abrasive wheel.

7. A pyrophoric lighter as claimed in claim 6 wherein the means for moving said slide to stress its actuating spring comprises a manually actuated trigger pivoted to said body, an arm pivoted at one end to said trigger and means at its opposite end for releasably engaging said slide, and means for automatically releasing said arm from said slide when said slide has been moved by said arm to stress the slide actuating spring and space the projection from an end wall of the slide.

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